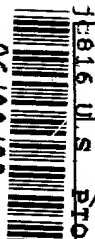




CLEARED

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 104

06/29/00



JCS36 U.S. PTO

UTILITY PATENT APPLICATION TRANSMITTAL

Submit an original and a duplicate for fee processing
(Only for new nonprovisional applications under 37 CFR §1.53(b))

ADDRESS TO:

Assistant Commissioner for Patents
Box Patent Application
Washington, D.C. 20231

Attorney Docket No. 204498
First Named Inventor JAMES
Express Mail No. EL303750837US

JCS36 U.S. PTO

09/606923



06/29/00

APPLICATION ELEMENTS

1. ☒ Utility Transmittal Form
2. ☒ Specification (including claims and abstract) [Total Pages 16]
3. ☒ Drawings [Total Sheets 2]
4. ☐ Combined Declaration and Power of Attorney [Total Pages]
 - a. ☐ Newly executed
 - b. ☐ Copy from prior application [Note Box 5 below]
 - i. ☐ Deletion of Inventor(s) Signed statement attached deleting inventor(s) named in the prior application
5. ☐ Incorporation by Reference: The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. ☐ Microfiche Computer Program
7. ☐ Nucleotide and/or Amino Acid Sequence Submission
 - a. ☐ Computer Readable Copy
 - b. ☐ Paper Copy
 - c. ☐ Statement verifying above copies

ACCOMPANYING APPLICATION PARTS

8. ☐ Assignment Papers (cover sheet and document(s))
9. ☐ Power of Attorney
10. ☐ English Translation Document (if applicable)
11. ☐ Information Disclosure Statement (IDS)
 - ☐ Form PTO-1449
 - ☐ Copies of References
12. ☐ Preliminary Amendment
13. ☒ Return Receipt Postcard (Should be specifically itemized)
14. ☐ Small Entity Statement(s)
 - ☐ Enclosed
 - ☐ Statement filed in prior application; status still proper and desired
15. ☐ Certified Copy of Priority Document(s)
16. ☒ Other: Check in the amount of \$846.00

17. If a **CONTINUING APPLICATION**, check appropriate box and supply the requisite information in (a) and (b) below:
- (a) ☐ Continuation ☐ Divisional ☐ Continuation-in-part of prior application Serial No. .
Prior application information: Examiner ; Group Art Unit:
- (b) Preliminary Amendment: Relate Back - 35 USC §120. The Commissioner is requested to amend the specification by inserting the following sentence before the first line:
"This is a ☐ continuation ☐ divisional of copending application(s)
☐ Serial No. , filed on .
☐ International Application, filed on , and which designates the U.S."

APPLICATION FEES



APPLICATION FEES				
BASIC FEE				\$690.00
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total Claims	12 -20=	0	x \$18.00	\$0.00
Independent Claims	5 -3=	2	x \$78.00	\$156.00
<input type="checkbox"/> Multiple Dependent Claims(s) if applicable			+ \$260.00	\$
Total of above calculations =				\$846.00
Reduction by 50% for filing by small entity =				\$()
<input type="checkbox"/> Assignment fee if applicable			+ \$40.00	\$
TOTAL =				\$846.00

UTILITY PATENT APPLICATION TRANSMITTAL

Attorney Docket No. 204498

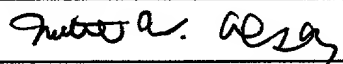
19. ☐ Please charge my Deposit Account No. 12-1216 in the amount of \$.
20. ☒ A check in the amount of \$846.00 is enclosed.
21. The Commissioner is hereby authorized to credit overpayments or charge any additional fees of the following types to Deposit Account No. 12-1216:
- a. ☒ Fees required under 37 CFR §1.16.
- b. ☒ Fees required under 37 CFR §1.17.
22. ☒ The Commissioner is hereby generally authorized under 37 CFR §1.136(a)(3) to treat any future reply in this or any related application filed pursuant to 37 CFR §1.53 requiring an extension of time as incorporating a request therefor, and the Commissioner is hereby specifically authorized to charge Deposit Account No. 12-1216 for any fee that may be due in connection with such a request for an extension of time.

23. CORRESPONDENCE ADDRESS

<input checked="" type="checkbox"/> Customer Number: 23460  23460 PATENT TRADEMARK OFFICE	<input type="checkbox"/> , Reg. No. Leydig, Voit & Mayer, Ltd. Two Prudential Plaza, Suite 4900 180 North Stetson Chicago, Illinois 60601-6780 (312) 616-5600 (telephone) (312) 616-5700 (facsimile)
Name	Y. Kurt Chang, Registration No. 41,397
Signature	
Date	June 29, 2000

Certificate of Mailing Under 37 CFR §1.10

I hereby certify that this Utility Patent Application Transmittal and all accompanying documents are being deposited with the United States Postal Service "Express Mail Post Office To Addressee" Service under 37 CFR §1.10 on the date indicated below and is addressed to: Assistant Commissioner for Patents, Box Patent Application, Washington, D.C. 20231.

Matthew W. Olson		June 29, 2000
Name of Person Signing	Signature	Date

UTILITY (Rev. 3/13/2000)

PATENT APPLICATION

Invention Title:

AN APPLICATION PROGRAMMING INTERFACE TO THE SIMPLE OBJECT
ACCESS PROTOCOL

Inventors:

Sarita M. JAMES	US	Bellevue	Washington
INVENTOR'S NAME	CITIZENSHIP	CITY OF RESIDENCE	STATE or FOREIGN COUNTRY

Shyamalan PATHER	South Africa	Seattle	Washington
INVENTOR'S NAME	CITIZENSHIP	CITY OF RESIDENCE	STATE or FOREIGN COUNTRY

Be it known that the inventors listed above have invented a certain new and useful invention with the title shown above of which the following is a specification.

TITLE

An Application Programming Interface to the Simple Object Access Protocol

TECHNICAL FIELD

5 This invention relates generally to computer operating system services, and, more particularly, to an application programming interface to the Simple Object Access Protocol.

BACKGROUND OF THE INVENTION

10 SOAP ("Simple Object Access Protocol") is a standard method for a client application running on one computer to request services from a server application running on another computer. SOAP encodes remote procedure calls into XML messages that are carried to the server by an HTTP transport protocol. By standardizing the protocol for this much-used service, SOAP eliminates protocol development redundancy and application-specific protocol variations. SOAP has been proposed to the Internet Engineering Task Force for consideration as an Internet communications standard. The proposal may be
15 found at <http://search.ietf.org/internet-drafts/draft-box-http-soap-01.txt>.

However, the proposed SOAP standard does not specify an application programming interface (API) to allow applications to easily use SOAP. Each applications development group must individually code the interactions between its application and the SOAP protocol, leading to resource waste through coding replication and possibly to
20 interoperability errors when connecting applications written by different development groups. Therefore, the lack of a standard SOAP API directly counters some of the benefits hoped to be achieved by using SOAP.

SUMMARY OF THE INVENTION

25 The above problems and shortcomings, and others, are addressed by the present invention, which can be understood by referring to the specification, drawings, and claims. The invention provides a general API for SOAP-using client applications. The API provides mechanisms for creating all parts of SOAP request messages, for sending the created messages over HTTP to a remote server, and, if the request is successful, for retrieving the response from the remote server, or, in the case of failure, for accessing
30 whatever error information is available. Applications developers building on top of this

API are freed from redeveloping these general mechanisms and can thus focus on the unique aspects of their applications.

In one embodiment of the present invention, the API consists of software objects. In addition to providing the well-known benefits of an object-oriented interface, this
5 embodiment parameterizes the information passed through the API. Because of this, both the SOAP protocol and the applications that use it can change without requiring changes to the API.

Besides the aspects, features, and advantages described, the invention includes other aspects, features, and advantages that will become apparent from studying the
10 following detailed description and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

While the appended claims set forth the features of the present invention with particularity, the invention, together with its objects and advantages, may be best understood from the following detailed description taken in conjunction with the
15 accompanying drawings of which:

Figure 1 is a block diagram generally illustrating an exemplary computer system which may support the present invention; and

Figure 2 shows the steps an application may go through when using an object-oriented SOAP API according to one embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Turning to the drawings, wherein like reference numerals refer to like elements, the invention is illustrated as being implemented in a suitable computing environment. Although not required, the invention will be described in the general context of computer-executable instructions, such as program modules, being executed by a personal
25 computer. Generally, program modules include routines, programs, objects, components, data structures, etc., that perform particular tasks or implement particular abstract data types. Moreover, those skilled in the art will appreciate that the invention may be practiced with other computer system configurations, including hand-held devices, multi-processor systems, microprocessor based or programmable consumer electronics,
30 network PCs, minicomputers, mainframe computers, and the like. The invention may also be practiced in distributed computing environments where tasks are performed by remote

processing devices that are linked through a communications network. In a distributed computing environment, program modules may be located in both local and remote memory storage devices.

Overview of a General-Purpose Computer

With reference to Figure 1, an exemplary system for implementing the invention includes a general-purpose computing device in the form of a conventional personal computer 20, including a processing unit 21, a system memory 22, and a system bus 23 that couples various system components, including the system memory, to the processing unit 21. The system bus 23 may be any of several types of bus structures including a memory bus or memory controller, a peripheral bus, and a local bus using any of a variety of bus architectures. The system memory includes read only memory (ROM) 24 and random access memory (RAM) 25. A basic input/output system (BIOS) 26, containing the basic routines that help to transfer information between elements within the personal computer 20, such as during start-up, is stored in ROM 24. The personal computer 20 further includes a hard disk drive 27 for reading from and writing to a hard disk 60, a magnetic disk drive 28 for reading from or writing to a removable magnetic disk 29, and an optical disk drive 30 for reading from or writing to a removable optical disk 31 such as a CD ROM or other optical medium.

The hard disk drive 27, magnetic disk drive 28, and optical disk drive 30 are connected to the system bus 23 by a hard disk drive interface 32, a magnetic disk drive interface 33, and an optical disk drive interface 34, respectively. The drives and their associated computer-readable media provide nonvolatile storage of computer-readable instructions, data structures, program modules, and other data for the personal computer 20. Although the exemplary environment described herein employs a hard disk 60, a removable magnetic disk 29, and a removable optical disk 31, it will be appreciated by those skilled in the art that other types of computer-readable media which can store data accessible by a computer, such as magnetic cassettes, flash memory cards, digital video disks, Bernoulli cartridges, random access memories, read only memories, and the like, may also be used in the exemplary operating environment.

30 A number of program modules may be stored on the hard disk 60, magnetic disk
29, optical disk 31, ROM 24, or RAM 25, including an operating system 35, one or more

5

10

20

30

personal computer 20, or portions thereof, may be stored in the remote memory storage device. It will be appreciated that the network connections shown are exemplary and other means of establishing a communications link between the computers may be used.

In the description that follows, the invention will be described with reference to acts and symbolic representations of operations that are performed by one or more computers, unless indicated otherwise. As such, it will be understood that such acts and operations, which are at times referred to as being computer-executed, include the manipulation by the processing unit of the computer of electrical signals representing data in a structured form. This manipulation transforms the data or maintains them at locations in the memory system of the computer, which reconfigures or otherwise alters the operation of the computer in a manner well understood by those skilled in the art. The data structures where data are maintained are physical locations of the memory that have particular properties defined by the format of the data. However, while the invention is being described in the foregoing context, it is not meant to be limiting as those of skill in the art will appreciate that various of the acts and operations described hereinafter may also be implemented in hardware.

An Application's Use of an Object-Oriented SOAP API

In accordance with one aspect of the present invention, Figure 2 shows the steps an application may go through when using an object-oriented SOAP API. The client-side application 36, shown running on a general-purpose computer 20, needs a service provided by the server application 200. To request the service, the client-side application first creates a SOAP Request Object in step 202. This object conveniently presents to the client-side application all the information it needs with respect to this one SOAP request.

In steps 204-208, the client-side application 36 opens the SOAP Request Object and writes into it the information needed to create the request message. This information includes the address of the server that will process the request and the request itself. According to one aspect of the invention, this information (and the response and status information described below) is passed via parameters: this allows both the client-side application and the SOAP protocol itself to change without requiring changes to the API. When all the information has been presented, the client-side application in step 210 tells the SOAP Request Object to format and send the request.

The SOAP Request message 212 is sent via the HTTP protocol to the remote server 49, shown here connected to the client-side application's host by a LAN 51. The connection between these two machines may be much more elaborate, involving dial-up modems, the Internet, and the like. The SOAP Request message is passed along to the server application 200. Ideally, the server application responds favorably to the request, performs the requested service, and sends back a SOAP Response message 214.

The SOAP API provides one place for retrieving all status and response information relevant to this one SOAP request. In step 216, the client-side application 36 queries the SOAP Request Object. If the request was successfully processed, this Object includes an indication of success along with whatever information the server application 200 passed along. Errors can occur anywhere in the communications system, from the client-side application's mistaken use of the SOAP API, to lack of resources (such as memory) on the client-side application's host machine 20, to congestion on the communications link 51, to unavailability of the remote server 49. Because of this, in the case of an error the SOAP Request Object includes not just a failure indication but as much error-resolution information as can be reasonably gathered.

In order to prevent the client-side application 36 from having to constantly poll the SOAP Request Object for response and status information, the client-side application may be suspended in step 210 when the SOAP request is sent. The client-side application is then reanimated when there is new response or status information for it to process.

A Detailed Usage Guide to an Object-Oriented SOAP API

The steps 202-210, and 216 of Figure 2 are now described in more detail. A COM-based embodiment of the present invention may be built around an object class called SOAPRequest which exports the interface ISOAPRequest. In the following, coding examples are given in JScript.

Step 202 Create a SOAP Request Object

A SOAP Request Object can be created using COM's standard object creation techniques. The following code creates the object, referring to the SOAPRequest class by the ProgID "SOAPAPI.SOAPRequest."

```
30       //Create a SOAPRequest Object
          var soapRequest;
          soapRequest = new ActiveXObject("SOAPAPI.SOAPRequest");
```

Step 204 Initialize the SOAP Request Object

A SOAP Request Object is initialized with information about the remote service being requested. The client-side application 36 provides the name of the procedure that will perform the remote service and, optionally, the name of the interface to which the procedure belongs. The following code passes the name of the interface as a URI (Universal Resource Identifier); this is optional and the interpretation of its value is left up to the remote server 49. The procedure name is simply a text string; here it is "LoadFile".

```

10      //Initialize the SOAPRequest Object
      soapRequest.Open("LoadFile", "IMediaPlayer", "uuid:47edc63b-4a80-494a-
      beea-39122c4a120c");

```

Step 206 Initialize the Headers of the SOAP Request Object

A client-side application 36 may wish to pass information to the remote server application 200 in addition to the information that is strictly part of the request for service. SOAP provides headers for this purpose, each header providing one piece of information for the server application. These headers and their attributes, including their number, names, and values, are not part of the SOAP specification but are defined by the client-side application. One embodiment of the invention parameterizes all of this information, thus allowing the information to change without requiring changes to the API. The information passing through the API in steps 208 and 216 is parameterized for similar reasons.

Each SOAP header is an arbitrary XML fragment containing a single root element. The root element may contain child elements or text. This is an example of a SOAP header called sequenceNumber:

```

25      <sequenceNumber>
          5
      </sequenceNumber>

```

Client-side applications 36 create header elements using XML DOM and then add them to a SOAP Request Object by calling the SetHeader() method. For more information on XML DOM, see Microsoft's XML Developer's Guide, incorporated herein in its entirety by reference. The following three code segments show the creation

and setting of a header. First, create a new XML DOM Document Object that will be used in creating the subsequent XML Nodes to represent each header:

```

//Create an XML DOM Document Object
var xmlDoc;
5   xmlDoc = new ActiveXObject("Microsoft.XMLDOM");

```

Next, use the XML DOM Document Object to create a sequenceNumber element and append to it a text node:

```

//Create the sequenceNumber Node
var sequenceNumberNode;
10  sequenceNumberNode = xmlDoc.createElement("sequenceNumber");
//Create the Text for the sequenceNumber and Attach It
var sequenceNumberTextNode;
sequenceNumberTextNode = xmlDoc.createTextNode("5");
sequenceNumberNode.appendChild(sequenceNumberTextNode);

```

15 Once the header element is created, it is added to the SOAP Request Object by calling SetHeader(). SetHeader() may also be used to change the value of an existing header.

```

//Add the sequenceNumber as a Header
soapRequest.SetHeader("sequenceNumber", sequenceNumberNode, 1);

```

Because headers are defined by the client-side application 36 and not by the SOAP specification, it is quite possible that the remote server application 200 will receive a header that it does not understand. According to the SOAP specification, a header contains a mustUnderstand attribute. If this attribute is set to 1, then the server application cannot process the request unless it understands this header. SetHeader()'s third argument is the value of mustUnderstand.

25 An application can delete a header element by calling DeleteHeader() and can read the value of a parameter by querying the HeaderValue property.

Step 208 Initialize the Parameters of the SOAP Request Object

Requests can take any number of parameters of arbitrarily complex data types. Like the header elements described in the previous section, parameter values are expressed as XML fragments. Each parameter element consists of a root element that may contain either child elements or text. This XML fragment shows how a parameter named fileName is specified in a SOAP request:

```

35  <filename>
      \\host\public\somefile.doc
    </filename>

```

```

5 //Create the fileName Parameter Node
    var fileNameNode;
    fileNameNode = xmlDoc.createElement("fileName");
//Create the Node Containing the File Name Text and Attach It
    var fileNameTextNode;
10 fileNameTextNode = xmlDoc.createTextNode("\\host\\public\\somefile.doc");
    fileNameNode.appendChild(fileNameTextNode);
//Add the File Name as a Parameter
    soapRequest.SetParameter("fileName", fileNameNode);

```

15

Step 210

20

25

Step 216

30

If `Execute()` returns a success code, then the `ResponseElement` property contains the contents of the `Body` element of the XML response sent by the server application 200.

5

10

15

A Detailed Definition of an Object-Oriented SOAP API

20

25

30

35

```

[id(3), helpstring("method DeleteHeader")]
HRESULT DeleteHeader([in]BSTR bstrName);

[propget, id(4), helpstring("property HeaderValue")]
HRESULT HeaderValue([in]BSTR bstrName,
                    [out, retval]IUnknown **ppUnkValue);

[propget, id(5), helpstring("method HeaderMustUnderstand")]
HRESULT HeaderMustUnderstand([in]BSTR bstrName,
                              [out, retval]VARIANT_BOOL
                              *pvbMustUnderstand);

10 //Parameter Manipulation
    [id(7), helpstring("method SetParameter")]
    HRESULT SetParameter([in]BSTR bstrName, [in]IUnknown *pUnkNewValue);

    [id(8), helpstring("method DeleteParameter")]
    HRESULT DeleteParameter([in]BSTR bstrName);

15    [propget, id(9), helpstring("property ParameterValue")]
    HRESULT ParameterValue([in]BSTR bstrName,
                           [out, retval]IUnknown **ppUnkValue);

//Invoke
    [id(10), helpstring("method Execute")]
20    HRESULT Execute([in]BSTR bstrTargetURI);

//Feedback
    [propget, id(11), helpstring("property ResponseElement")]
    HRESULT ResponseElement([out, retval]IUnknown **ppUnkValue);

    [propget, id(12), helpstring("property ResponseHeaders")]
25    HRESULT ResponseHeaders([out, retval]IUnknown **ppUnkValue);

    [propget, id(13), helpstring("property ResponseFaultCode")]
    HRESULT ResponseFaultCode([out, retval]BSTR *pbstrValue);

    [propget, id(14), helpstring("property ResponseFaultString")]
    HRESULT ResponseFaultString([out, retval]BSTR *pbstrValue);

30    [propget, id(15), helpstring("property ResponseFaultDetail")]
    HRESULT ResponseFaultDetail([out, retval]IUnknown **ppUnkValue);

    [propget, id(16), helpstring("property ResponseHTTPStatus")]
    HRESULT ResponseHTTPStatus([out, retval]long *plValue);

35    [propget, id(17), helpstring("property ResponseHTTPStatusText")]
    HRESULT ResponseHTTPStatusText([out, retval]BSTR *pbstrValue);

```

```
[propget, id(18), helpstring("property RequestXMLText")]
HRESULT RequestXMLText([out, retval]BSTR *pbstrXMLText);
};
```

Conclusion

In view of the many possible embodiments to which the principles of this invention may be applied, it should be recognized that the embodiments described herein with respect to the drawing figures are meant to be illustrative only and should not be taken as limiting the scope of invention. Therefore, the invention as described herein contemplates all such embodiments as may come within the scope of the following claims and equivalents thereof.

CLAIMS

We claim:

1. A method for an application to communicate with a procedure on a remote server via the Simple Object Access Protocol (SOAP) comprising the steps of:
 - 5 issuing, by the application, a call to initialize a SOAP request, said initialization including specifying the procedure on the remote server;
 - issuing, by the application, a call to set the body of the SOAP request, using a set of parameters to specify said body;
 - 10 issuing, by the application, a call to request that the SOAP request be sent to the remote server;
 - issuing, by the application, a call to query the SOAP request to obtain status information; and
 - issuing, by the application, a call to query the SOAP request to obtain
15 response information sent from the procedure on the remote server.
2. The method of claim 1 further comprising the step of:
 - issuing, by the application, a call to set a header in the SOAP request,
20 including in said header a value for the mustUnderstand attribute;
3. The method of claim 1 wherein the call to request that the SOAP request be sent to the remote server does not return until either response information is received from the remote server or a set amount of time passes.
- 25 4. The method of claim 1 wherein the SOAP request is a software object and the issued calls are to methods of the SOAP request software object.
5. The method of claim 4 further comprising the step of:
 - issuing, by the application, a call to instantiate the SOAP request software
30 object.

6. A computer-readable medium containing instructions that when executed cause a computer to communicate with a procedure on a remote server by performing the steps of:

initializing a SOAP request, said initialization including specifying the
procedure on the remote server;
setting the body of the SOAP request, using a set of parameters to specify
said body;
sending the SOAP request to the remote server; and
querying the SOAP request to obtain status and response information.

7. A system for using SOAP to communicate with a server application on a remote host comprising:

a local host;
a client application running on the local host;
a communications link connecting the local host with the remote host; and
a set of functions running on the local host callable by the client
application to specify a SOAP request, to send the SOAP request
to the remote host via the communications link, and to obtain
status and response information concerning the SOAP request.

8. The system of claim 7 wherein the set of functions is an application programming interface (API).

9. The system of claim 8 wherein information passed through the API is in the form of parameters.

10. The system of claim 8 wherein the API consists essentially of software objects.

- 10

ABSTRACT OF THE INVENTION

5

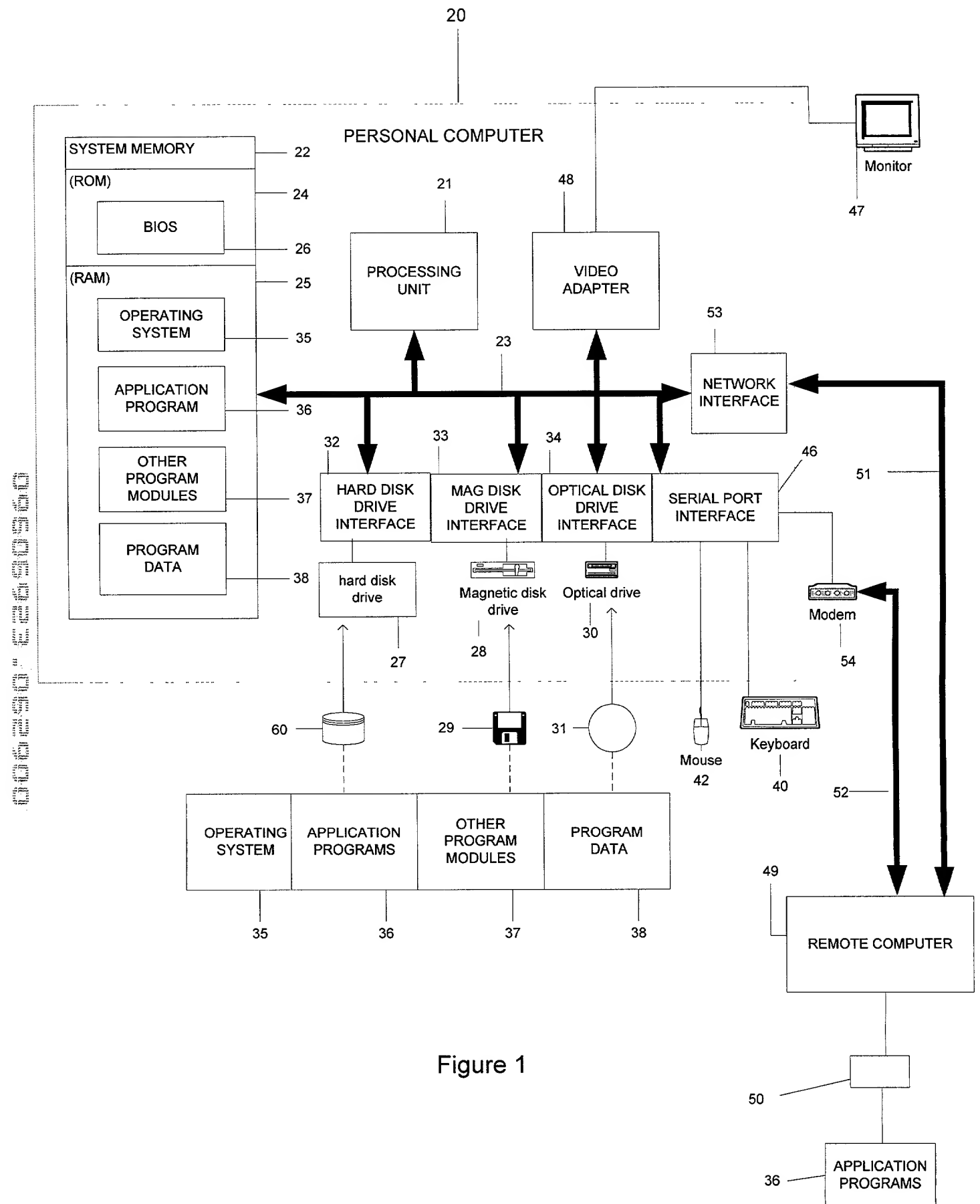


Figure 1

